solplan review

the independent newsletter of energy efficient building practice

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INSIDE..

Polyethylene is a fundamental element in air tight construction practice, yet there is evidence that much of the poly on the market may not be adequate for use as an air vapour barrier. The durability of poly, the history of its use, an overview of its physical and chemical properties, the need for standards and points to consider when buying poly are discussed.

A new energy efficient prefabricated building system developed in Canada is discussed, as is an alternate building method using rigid materials for air vapour barriers.

Carl Curtis provides a builder's point of view on the ADA approach.

The new federal budget means that housing prices will increase, as federal sales tax will now apply on insulation materials and HRV's.

Other stories include news about changes to Plumbing Codes, National Building Code, and updates on HRV installer certification program.

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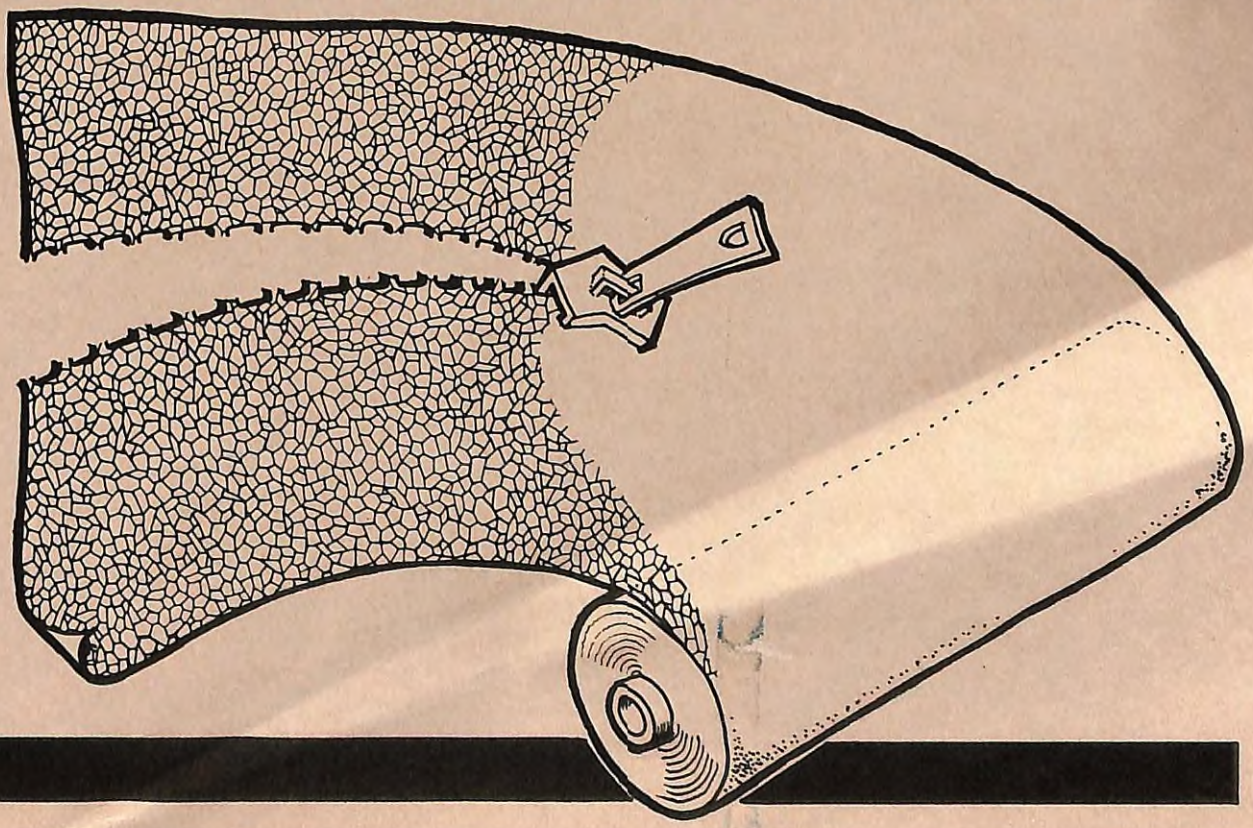
THE POLYETHYLENE QUESTION: DURABILITY



FROM THE PUBLISHER

In this issue we are asking some hard questions about a common building material. Questions which did not arise in a government study (although resolution of the questions may require one), were not disclosed by a manufacturer (although many industries are very good about providing hard data about products). The initial question was asked by a practitioner of energy conservating construction. A member of our audience.

While we talk to a variety of people, the small scale practitioner has both the practical experience and the immediate need to appreciate our product.

Neither the government nor manufacturers have the ability 'to spread the word' in quite the same way as the private journalist.

Government may wait until a new product or technique is obvious before they advise the marketplace it exists.

Industry tends to fall off the deep end when they describe the wonders resulting from their efforts.

We fill a gap in the information system. A place where rumour and result, where speculation and experience can be laid before the building practitioner.

As a business proposition this effort is almost without merit (which is probably why we find ourselves without a lot of private competion). When we started we calculated the costs of a very modest national newsletter and how many subscriptions would be required to justify the investment. Without giving away anything to potential competitors, we find ourselves with not enough subscriptions to succeed, but too many to allow ourselves to fail.

If you didn't pay for the document you are holding, seriously consider doing so.

Richard Kadulski

INFORMATION WANTED

Mike Dorgan, is a consultant working on several projects in the field of glazed structures, including development of a general design guide, work on specific construction projects and compiling a directory of products and services.

He would like to receive information from manufacturers, dealers and installers on any material or information you believe to be unique or hard to find.

Technical information on products such as: glazing materials, glazing systems (extrusions, bar caps, etc.), glazing components (gaskets, sealants, etc), sun control devices, ventilation and cooling equipment for glazed structures, control systems for sun control or heating and ventilation equipment.

He is prepared to cover nominal costs for this information and or samples. For further information contact:

Mike Dorgan
Glazed Structures Consultant
161 Flora St.
Ottawa, Ont. K1R 5R4
Tel: 613-236-4528

KOEHLI QUITS R2000

Al Koehli, the R2000 program coordinator for B.C. has resigned his position effective the end of June, 1985.

Al is well known in the building community for his extensive practical experience in construction. He has been actively involved for many years with research work to improve and simplify construction techniques, to provide the best technical solutions to practical building problems.

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THE POLYETHYLENE QUESTION

How Durable is Poly?

Polyethylene manufactured and sold in Canada may not be adequate for use as a vapour barrier in air tight construction.

Integral, sealed poly 'air-vapour barriers' are encouraged and in a few cases required in current energy efficient construction.

In effect, air-tight construction is commonly achieved by forming a 'plastic bag' around the living space.

But just how durable is polyethylene? It is, after all, an organic material, and subject to breakdown. Its use in construction is quite recent. Recently, concerns have been expressed that this key element may well be the weakest link keeping a house air tight.

Unless poly is manufactured to an appropriate standard, and protected from degradation before installation, it may not be an effective air vapour barrier for the service life of a building.

No standards presently exist in Canada for quality testing or manufacture of poly. The only standard listed by the Canadian Government Standards Board (CGSB) is titled 'Polyethylene Sheet for Use in Building Construction'. The purpose of the standard 'is to control the thickness of polyethylene sheet material and to provide a basis for its procurement'. Nothing about lifetime use, UV stability, chemical or biological resistance, thermal stability, etc.

It is possible to manufacture poly film for use in residential construction that will resist the test of time and exposure. Unfortunately, such materials are not being manufactured in quantity, nor do we have any standards in this country by which such materials can be tested.

The plastics industry is aware that there are problems. It is working on the development of standards which might be in place by the end of this year. However, there are many committees and agencies that have to review and agree on the new document. Once they're approved, it will take more time before they finds their way into the codes.

When these are in place, there is still the question of how the new standards will be enforced.

History of Poly Use

Polyethylene film was introduced into the residential construction industry in the early 1950's. It was intially used to replace the asphalt-kraft paper vapour 'barriers' which were used beneath loose fill attic insulations. These vapour barriers were designed to retard vapour movement by diffusion and not to stop the movement of air which may carry moisture with it. In essence the early use of the term 'vapour barrier' was actually refered to a vapour diffusion retarder.

Polyethylene was brought into wide use as a ground cover material in the crawl spaces of homes in the late 1950's and early 1960's. It was also promoted as a 'vapour barrier' in the campaign to promote electric heating in houses in the 1960's.

In the early 1970's poly began to be widely used as a vapour barrier in the walls of houses and was installed over the traditional asphalt-kraft paper vapour barrier on wall insulation batts.

In the mid 1970's it was recognized by regulatory agencies that (in residential construction) air movement was a significant factor in moisture movement, although this information had been available from the research community for some time. Subsequently the use of the term 'air-vapour barrier' was adopted. The air-vapour barrier was meant not only to retard vapour diffusion but also to prevent air movement. Poly was thought to be able to serve this function of an air-vapour barrier and was promoted as such in the late 1970's. It was not, however, installed in a continuous manner, nor were seams sealed. Joints were commonly overlapped, and rim joists or header joists typically ignored.

Physics & Chemistry

Polyethylene is subject to breakdown by radiation degradation, thermal oxidation, chemical and biological attack.

During manufacture, polyethylene is typically mixed with additives to facilitate processing. These additives themselves alter the physical and chemical properties of pure poly.

Protection against degradation caused by heat, oxidation, and solar radiation

can be provided by the addition of stabilizers.

Radiation degradation

Solar radiation is composed of a broad band of energy. Ultra violet radiation provides sufficient energy to break the carbon bonds in poly molecules. Fortunately, biologicaly active UV forms only about one percent of total solar radiation at the earth's surface. The magnitude of UV radiation depends on season, climate and location, so that significant variation in outdoor weathering of poly can occur.

High energy irradiation of poly can initiate the reverse of the process that created poly. It is sometimes refered to as the unzipping of the polymer, and leads to a catastrophic chain reaction. UV retardant additives which may be added are typicaly pigments which reflect or absorb UV.

Some concerns have been expressed that the breakdown of poly film due to UV exposure, once started, will continue even after the UV source is removed. Unfortunately, the vast majority of poly film used in residential construction in North America is insufficiently stabilized against UV degradation to provide adequate service life.

Thermal oxidation

Some organic materials such as polyethylene are especially susceptible to deterioration by oxidation. Poly films used in residential construction are typicaly manufactured and installed in environments which allow continued contact with oxygen in the atmosphere. At room temperatures oxidation in poly is a slow process - but increases with higher temperatures.

Rapid oxidation of poly film can also occur in the presence of ozone. Ozone is an extremely reactive gas (it is an unstable derivative of oxygen). Concerns have been expressed that where electronic air cleaners are used, the ozone produced as a result of their use could accelerate the deterioration of poly films.

Additives can retard the oxidation process. Unfortunately, poly films used in residential construction are not usually stabilized against oxidation. No current standards dealing with thermal oxidation of poly film exist.

Chemical attack

Poly film has excellent resistance to degradation by a wide range of chemicals. Polyethylene films in residential construction are unlikely to come in contact with the limited number of reagents which affect poly.

Concerns have been raised about the potential degradation of poly in contact with concrete. An ORF study found no direct evidence of deleterious chemical attack on poly films.

One of the few concerns in this area remains the reaction of poly films with certain wood preservatives. It is thought that copper napthanate may induce degredation.

Biological Attack

Organic compounds are susceptible to attack by micro organisms. There are suggestions that conditions present in wall cavities and beneath concrete slabs are ideal for these critters.

HOW TO BUY POLY

What to do when you need to use polyethylene?

- Look for clear material (if it's milky or cloudy, chances that deterioration has already set in).
- If you must resort to using poly, when buying it from your dealer, don't pick up a roll that's been siting in a place where the sun gets at it - look for material that has been stored in a dark spot.
- Always keep poly covered, protected from the sun. Keep poly exposure to sunlight to a minimum.
- If at all possible, use only UV stabilized ('greenhouse' grade) poly - it's more expensive, but will provide a longer life.
- Or use a product like Tu-Tuf, which is a UV stabilized, cross laminated poly.

The Need for Poly Standards

Just how serious are the potential problems with polyethylene? How serious are durability concerns?

We have heard it alleged that relatively new walls, which had incorporated poly have been opened to reveal hardly any trace of the poly. Others say they have seen 20 year old installations looking as if they were only installed last year.

CMHC has been studying the issue. The only conclusive results point to the variable quality of poly on the market.

Joe Lstiburek has uncovered that recent tests conducted for EMR revealed that only one of the polyethylene films manufactured in Canada for use in residential construction came close to meeting the standard developed by the Swedish National Authority for Testing and Inspection (based on an accelarated test method to simulate the lifetime residential service). Furthermore, the testing revealed that great disparities exist between the actual performance of films from various manufacturers within the sample.

New standards that are being prepared will deal with moisture transmission, thickness, thermal stability, and UV protection in packaging (but not necessarily in the poly itself).

Until such time as Canada establishes its own testing and performance standards, there is no reason why we cannot use the Swedish standards on a temporary basis.

What is a builder supposed to do? Forget about polyethylene? After all it does provide an effective, workeable way to build tight houses. The potential problems provide compelling arguments in favour of alternate building techniques that do not rely on poly alone. Techniques such as the Airtight-drywall approach (discussed in SR no. 2) or the proprietary systems discussed in this issue may provide an answer.

If there is a greater demand for quality products, manufacturers could be expected to meet the demand.

CASE STUDY: Poly Failure

A polyethylene vapour barrier failure occured in a Saskatchewan house in 1983.

The house was owner-built, with double wall framing, sheathed over a three week period in July 1983 when the weather was exceptionally hot and sunny. The poly may have been stored for a few days in direct sunlight before installation, and it was stretched tightly during installation. After installation the poly was exposed to direct sunlight for up to two weeks before the roof sheathing was installed.

The main failure occured mid December after the onset of a severe cold spell when maximum temperatures fell to around -26°C. At this stage the house had been insulated on the exterior, but no insulation had been installed inside the poly. One door was still not installed, and the house was unheated.

A report prepared by the Saskatchewan Research Council, which investigated the problem, concluded that the failure of the polyethylene had three principal causes:

1. The poly was streched too tightly during installation. This was easy to do by the unusually high temperatures at the time.

2. The failure was triggered by excessively low temperatures, which changed the physical properties of the poly to the point where it could no longer sustain the strains placed on it during installation.

3. Exposure to UV radiation from the sun is believed to have contributed to the eventual failure.

In conventional building practice the building schedule is relatively short, and the vapour barrier receives relatively short exposure to direct sunlight. Houses are completed and the heating is installed quickly.

This example emphasizes the importance of installing poly without stretching it, as the stretching builds stains into the material, that may ultimately lead to stress failure. A baggy vapour barrier is better than one which is fitted tightly.

THE POLYETHYLENE QUESTION

This situation is of special interest to applications of poly vapour barriers on the exterior of houses, as would occur with Larsen truss type construction or retrofits. In such instances, the houses may be exposed for prolonged periods to low temperatures and UV radiation during construction.

TU-TUF

If you haven't heard of this product, you're not alone. The product is manufactured by Sto-Cote Products Inc. of Richmond, Illinois. It has not yet been introduced into Canada.

Tu-Tuf is a UV stabilized laminated poly that is much stronger (and more puncture resistant) than conventional poly. It is made in 3 mil and 4 mil thicknesses.

Its strength makes it much more resistant to the tears and rips that poly is normaly subject to. However, the material is more stiff and slippery than ordinary poly, so it takes some care when being used.

The manufacturer is presently awaiting CMHC testing to be finalized. They are completing distribution arrangements in Canada, and expect to be able to make an announcement this summer.

The product is not cheap - smaller quantities retail at about 6.5 - 7.5 cents per square foot in the U.S. With the present situation of the dollar, it is probable that the Canadian price will be no less than about 11 cents per square foot. However, if you are using the poly approach, materials should be used that will stand the test of time.

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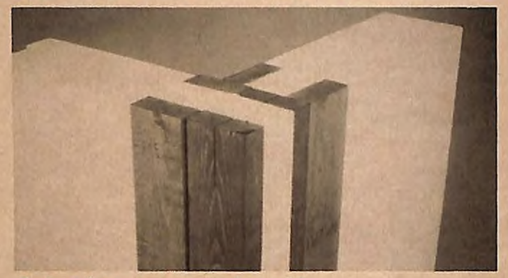
NASCOR BUILDING SYSTEM

NASCOR: A new Canadian product - a prefabricated, energy efficient load bearing exterior wall assembly system.

The NASCOR system has 2 basic components - wood and polystyrene columns and solid polystyrene infill panels. These components provide an easily assembled load bearing wall, suitable for use wherever conventional wood framing is permitted. The systemn is compatible with standard wood framing.

Basic components are columns, infil panels, cripples, and splines.



Exterior corner detail

Columns are the principal structural element. They consist of 2 - 38 x 89mm wood studs turned so they are parallel to the wall, bonded to a polystyrene core. In this way thermal bridging, which normally occurs through studs in conventional framing is avoided. Columns are spaced 400 mm or 600 mm on centre, depending on requirements of the structure.

Infill panels fit between the columns. They are keyed to use splines (narrow foam strips) - which are used to interlock panels to form airtight seals in the wall.

Cripples are column units which have been pre-notched to make it easy to fit lintel pieces which are similar to the column sandwich material.

All units are factory profiled, to accomodate wiring in the wall at 24 inches above the floor.

Because the system components are factory made, optimum quality control can be maintained, and waste on site is eliminated. Material uniformity is assured as long term settlement of isulation (possible with loose fill or some batt materials) cannot take place.

Polystyrene is a stable, non toxic foam material that has been in use since 1951. It's non-toxic nature is well known (it's what plastic coffee cups and food trays are made from). Its durability is known in the boating industry, where it is used for flotation for docks and boats.

The foam is not a structural sheating material - some form of structural bracing is still required. The product must also be finished on the interior and exterior.

The components can be used as a framing kit for on site construction, or preassembled as prefabricated wall elements in 8 to 16 foot long sections.

Interior view of unit with vaulted ceiling panels. Note electrical service channel.

Panels can be made up for use in vaulted roof applications, but they are more expensive than conventional roof systems.

Preassembled wall sections for an average 1200 sq.ft house can be erected in about 2 hours. If used as a framing kit, site assembly and erection would take about 8 hours.

The product is CMHC approved (CMHC Evaluation Report 10753 - Sept. 1984).

Cost? Comparable to conventional superinsulated framing costs. One Alberta contractor prepared a cost breakdown in March 1984, comparing all costs associated with exterior wall framing of a 26' x 40' bungalow. His figures show: conventional 2x4 (R12): $1700.00, conventional 2x6 (R20): $2233.00, NASCOR R20: $2023.00.

The system has been used in a recent R2000 house in Calgary.

In the past year (since the introduction of the system) some 1000 housing units have been built with this method in Alberta and Ontario.

Alberta Hutterite colonies are so happy with their trials of the system, that they are now planning to use it for all their building requirements (including barns, hog shed, etc, as well as residential needs).

Advantages

1. Provides backing support for wall finishes even if no solid sheathing is used.
2. Provides stiffer wall finishes, decreases vibrations resulting in increased noise attenuation.
3. Trades are unlikely to omit installing insulation in any wall sections.
4. Good inherent air barrier.
5. Good vapour retardant potential
6. If burned gives off only carbon dioxide, not toxic fumes.
7. Sufficiently strong to support the full weight of a workman in all directions.
8. Fast erection and good quality control as panels are factory assembled.
9. One operation erects studs and insulation.
10. Studs have a thermal break.
11. Higher thermal resistance value for the same thickness of conventional wall insulation.
12. Wall sheathing can be omitted in certain areas.

Disadvantages

1. Accuracy in construction is dependent on accurate estimating and shop drawings from the manufacturer.
2. Inherent in preassembled panels is lack of flexibility to make changes on site.
3. Other trades may have to cut polystyrene insulation to install wiring, pipes, electrical boxes, etc.
4. Thermal bridging still exists through top and bottom plates.
5. Components for roof system are not economical. Manufacturer presently recommends used of standard framing or trusses.
6. Plumbers and other trades must be careful not to use flames or other heat tools near the walls until after they are sheathed.

For further information, contact:
CANO Structures Inc.
7803G - 35th St. S.E.
Calgary, Alta. T2C 1V3
(403) 279-1966

RIGID AIR/VAPOUR BARRIERS

By Brian Mehaffey

POLYISOCYANURATE A/V Barriers

One alternative to polyethylene air/vapour barrier construction is the use of poly-isocyanurate foam insulation board. This material is a rigid foam board faced with aluminum foil on both sides. One product is marketed under the trade name Thermax (it is available in 4' x 8' and 4' x 9' sheets). Other brand names may be available.

Polyisocyanurate has the highest R value of any of the commonly available insulation materials. Thermax lists its aged R value at RSI 1.27 (R 7.2/inch) which is considerably more than polystyrenes (4.5/inch) or fiberglass batts (3.3/inch). If a 3/4 inch airspace is provided an additional R value of approximately 2.8 can be provided by the action of the foil facing. The foil also provides an excellent air and vapour barrier when joints are sealed with aluminum tape. The material is stable over time.

Due to the benefit of the 3/4 inch airspace, the material lends itself to strap wall systems. Placing the poly-isocyanurate board on the inside of a standard stud wall also provides an excellent means of cutting the thermal bridging through the studs and cross strapping. Two inch cross strapping run horizontally on the inside of the wall then provides a chase for the installation of electrical wiring and shallow electric boxes.

A number of builders have used this system during the last phase of the R2000 program. When air tested the homes fell well within the R2000 limit for house air-tightness.

This system has a lot going for it - ease of construction, good life expectancy, and a wide range of installed R values in the wall (sheets are available in thicknesses ranging from 1/2 inch to 2 inches).

A common complaint among builders of energy efficient houses is the inconvenience of caulking and sealing to provide the required level of airtightness. Because poly-isocyanurate are rigid boards the material works well with alternate means such as ethylfoam backing rod. The backing rod is applied to the top and bottom plates of the wall with staples, then the poly-isocyanurate board is applied vertically and tacked in place.

Joints are sealed with an aluminum tape, then horizontal wood the strapping is applied. This strapping will hold the interior wall finish, and is most often applied at 24" centres. Usually the sheets have the manufacturer's name printed on one side. The name should be placed facing the exterior of the wall as the ink will reduce the reflective area of the sheet.

Care should be taken to seal any punctures that may occur during construction.

Ceilings can also be done using the same method although polyethylene works well if installed prior to installation of the interior partitions. If polyethylene is to be used, the ceiling barrier should be installed first and a 3 to 4 inch strip left hanging around the building perimeter. The backing rod would then be stapled through the poly into the top plate before application of the rigid board. If poly-isocyanurate is to be used for the ceiling it should be also applied before the installation of partitions and electrical wiring.

As builders look for easier and more convenient ways to bring energy efficient homes into the marketplace many may find that this type of system fits the bill. The extra material cost should be offset by the higher insulating value per inch thickness, and lower labour costs to achieve airtight construction.

The manufacturer cautions that Thermax sheathing should only be used in strict accordance with manufacturer's application instructions. The use of this product in conjuction with exposed combustible building components may contribute to rapid spread of fire. Thermax by itself or used in conjuction with non-combustible building components will burn but will not contribute to rapid spread of fire.

Brian Mehaffey is the former manager of the Nanaimo Energy Information Centre, and is presently a building inspector for the City of Nanaimo, B.C.

COMMENTARY On The Airtight Drywall Approach

By Carl Curtis

I'm afraid I have some reservations about the ADA system, and although the authors have probably answered some of my queries in their lectures or articles, some of their points may need further expanding upon.

One concept or system, will never be perfect and definitely won't apply to each situation, but maybe through discussion and alteration, each system will be improved upon.

Our company has built several superinsulated houses (under the R2000 program) using the double wall system.

Our method is to frame the exterior 2x4 wall, install the roof trusses, sheathing and roofing. We have eliminated exterior plywood sheating but use 1x4 let-in braces for structural strength. Before interior work is started, the exterior is wrapped with 9 ft. Tyvek, windows, doors and siding are installed.

Insulation (R28 fiberglass batts) is installed in the 2x4 wall from the inside. The batts are allowed to overlap the studs. A 3 inch filler piece is installed adjacent to the double top plates. 6 mil poly is then wrapped around the interior of the outside wall. Depending on the size of the house, one joint is all that is required.

The second outside 2x4 wall is then framed inside the poly. Poly is also applied to the ceiling in one continuous piece and the ceiling drywall applied before any interior framing is started. Only after the interior walls are erected are the subtrades called in - electrical, plumbing and mechanical.

A second layer of insulation (R12) is installed in the walls when the ceiling is blown. The insulator has to make two trips, but also has to in conventional houses if blown insulation is used in the ceiling. The drywaller makes two trips, but the ease of doing the ceiling offsets the extra trip.

The poly is stapled and caulked only the day before the drywall is installed on the walls. The backs of door and window jambs are coated with two layers of sealer and the wall poly caulked and stapled to the jamb backs.

All electrical and plumbing pipes that penetrate the vapour barrier have rubber gaskets fitted over, which are then caulked and stapled.

Here in Salmon Arm the 2x6 wall (R20) was starting to replace the 2x4 wall in 1978, and is now fairly standard construction practice - certainly nobody today wants a standard R12 house. In another few years, will this be the fate of the R20 house? We are constructing houses that we hope will last 60-80 years, so we try to install the most insulation possible (R40) without penalizing the first homeowner. I wonder if a R26.7 (2x6 plus 1 1/2" of rigid insulation) is adequate? Adding insulation later is difficult. I am told that Sweden requires all new construction to have R33 walls as a minimum.

I have heard the idea that as long as the house is tight, the amount of insulation can be moderated. After living through the CHIP fiasco, I think one would opt for the thicker insulation.

Although I haven't read all the reports on the degradation and breakdown of poly, there seems to be enough information around to cause concern. Some reports question the quality of the product itself, although those tests I have heard about are on houses up to 20 years old. I assume the majority would be 2 mil, and wonder if 6 mil would be any better? We are using 6 mil poly, and until more information is available, will probably upgrade to 6 mil greenhouse grade polyethylene, or maybe even a cross laminated poly (both of which are more expensive).

As far as wind pressure on exterior corners is concerned, since we frame up our walls individualy, our wall poly is usually one continuous piece with only one joint, which is caulked, stapled, and supported. We try to put the joint on an interior wall if at all possible. The floor and ceiling joints are both caulked, stapled, and supported. There's no doubt that caulking is a tedious and messy affair - but certainly thorough if done properly.

It is suggested that too much supervision is required on tract houses because of the trades piercing the vapour barrier. There are two ways of looking at this: first - the subtrades cannot be trusted and thereby have to use the

drywall approach since any holes are visible. But some of the critical sealing areas in the drywall approach are then placed in the hands of the framing crew and labourers. Speaking from personal experience, the framers are one of the roughest sub-trades! I would like to think that all sub-trades can be trained in new concepts which have been proven by a few tract builders. As the technology grows and useage becomes more widespread, all facets of the new concepts will become easier and improved.

Tyvek has replaced building paper and a 9 foot roll wrapped completely around the house is an ideal air barrier. Using Glasclad with Tyvek to the outside and taping the joints does not appear to function properly.

Joe Lstiburek mentions that Glasclad sheets are reversed, with the Tyvek backing on the inside, but the Tyvek can't be taped together in that position. One of the reasons for objecting to poly was the wind pressure that is exerted upon it - I wonder how effective an air barrier with an 8 or 9 foot crack every 4 feet is?

I have no problem understanding that the air tightness levels of the of the drywall approach are consistent with poly. Air quality and ventilation have caused a lot of concern because of this tightness, and will continue to some extent until owners fully understand the new technology. There's a certain percentage of vapour diffused through the walls, and I wonder if a high humidity condition that might result from a lack of ventilation from these misunderstandings, will cause some further concerns for the drywall approach?

The drywall approach certainly seems easier and of course less expensive than the double wall or other system. Somebody who specifically asks for an energy efficient house will understand and know the importance of the drywall as the vapour barrier. Sell that same house once or twice, and visions appear of somebody punching 3 or 4 nail holes through the exterior gyproc looking for a stud to hang a picture. Or a bath renovation where a new medicine cabinet is installed on the exterior wall and the edges aren't caulked. The person that repaints the walls and somehow misplaces one or two of the foam gaskets at the electric outlets.

The plastic clips that fit into the prongs of an electrical outlet are another cause for concern. We installed them in our own house for shock protection for our children. One day I noticed a few of them missing and located them in the toybox!

These problems aren't restricted to the drywall approach. All new technology takes time to gain acceptance and understanding, but a vapour barrier that is installed back out of harm's way seems a better alternative.

I wonder about the life expectancy of poly foam gaskets. Is standard poly with a supposed average life span of 25 to 30 years being replaced with a product that will breakdown before that? Accelerated aging tests would go a long way to alleviate these concerns.

I haven't addressed the ventilation issue other than to say that heat recovery should be an integral part of any concept.

There is no doubt in my mind that the drywall approach will gain popularity because of it's simplicity and lower cost. Such things as gasket life expectancy, owner participation, optimum wall insulation levels and drywall performance as vapour(air) barrier will have to be given careful consideration.

The double wall concept is definitely more expensive, but it does contain a completely selaed, protected vapour barrier, continuous air barrier, and increased R value in the walls. The question remains - are the added features worth the extra cost, not only for the present but also for the future?

As for the poly, if the quality can not be obtained, and problems persist, then first find an alternate product to replace poly before shelving the entire concept.

I think the sooner accelerated aging test procedures are instituted for all products, the easier it will be to choose not only what concept is best, but also the best concept for each particular application.

No matter what energy conservation system is used, a lot will depend upon individual requirements. At least the emphasis seems to be shifting from whether we should use extra insulation and apply conservation, to deciding what concept is best.

Carl Curtis is a contractor in Salmon Arm, B.C.

LETTERS TO THE EDITOR

Sir,

The 'New Products' article in your April-May 1985 issue (SR no. 2) contains untrue and damaging remarks about our product, manufactured in B.C., in favour of a new and untried product imported from elsewhere.

I am referring to the comments regarding asbestos-cement board, manufactured by this company in Mission, B.C.

Taking one comment at a time, having already said that light sheets of foam insulation whip around in the wind, your author, Terry Lyster, complains that asbestos-cement board is heavy. He also says that it is fragile and expensive - both loaded words, and comparative in nature.

He says the 'sheets are devilishly hard to cut'. Not so. Flat asbestos-cement sheets can easily be cut by the score and snap method as shown in the instruction sheet which is readily available.

'Clouds of asbestos dust swirling around while installing them' simply do not exist. Firstly, asbestos is 'locked-in' the product and cannot be released except by high-speed abrasion, such as with an abrasive wheel or sander. Even under these circumstances the dust released is mostly cement dust with a small percentage of asbestos dust, which itself has been modified by its association with cement.

I find it difficult to visualize a situation where a helper might roll a 'wheelbarrow full of boulders over a stack of sheets' as suggested, but in any event, even if such an unlikely incident took place, you would end up with cracked sheets, not a 'couple of tubs of asbestos cement dust' as stated.

Also, the statement referring to one's gardener backing a Bobcat into the foundation wall, infers that the alternative product would remain serviceable, which is totally incorrect.

In the interest of truth and the reputation of your publication, I strongly recommend that you publish a retraction of this irresponsible and stupid paragraph.

In conclusion, asbestos-cement sheets have been buried for up to thirty years with no visible deterioration. One cannot help wondering whether the 'new product' will build up such a reputation.

William Aldridge
President, Turners Building Products
Mission, B.C

Mr. Aldridge does not appreciate a feeble attempt to humorously describe an experience with asbestos cement board. The series of incidents described in the commentary actually did happen.

The comments were directed at the generic product - no reference was made to any one company's products.

That instruction sheets on how to work with the product are available is not common knowledge. The building yard which supplied the material did not volunteer the information.

Unfortunately, too often buyers are not aware that such instructions are available. Ed.

Sir,

Government research such as are carried out at NRC, EMR or their provincial counterparts is expensive and in my opinion, this valid research can be more effectively carried out in the private sector and the quasi-private sector such as SESCI or the proposed CONSERVATION/RENEWABLE ENERGY INDUSTRY COUNCIL as proposed by Brian Kelly of Marbek.

Although cutbacks in federal programs seem to cut into present research programs at NRC and EMR, the work can continue more effectively in the quasi-private sector. Funding for this work could come from the private sector (us) together with additional grants from federal and provincial governments.

The federal cutbacks will foster an indigenous research community which will develop new technology and products in a more efficient manner with the added benefit of being a lighter burden on the taxpayer.

To this end, I cite the air-tight drywall approach practical research work done by Joe Lstiburek and his associates and 'The Solarium Workbook'. Both these projects were undertaken in the private sector with grants from federal and

provincial governments as well as under the CHBA. If these projects were done in the government sector, they would have been much more expensive. Another advantage of research in the private sector is that it is publicized and put into practice sooner.

The governments of both the USA and Canada are working to reduce their national debts. This is providential as the private sector is forced to take the intiative and ultimately develop a better and healthier society.

Let us work towards reinforcing SESCI or the CONSERVATION/RENEWABLE ENERGY INDUSTRY COUNCIL

David F. Begin, P.Eng.
Ecostud Building Products Ltd., Edmonton

Much of the NRC and EMR research work has been contracted out to the private sector, but funded by government money. The funding cutbacks in fact mean that there will no longer be government funds for energy related work such as the examples cited by David Begin.

We are fully in favour of greater private initiative (this publication has been undertaken in the free enterprise spirit, with no government funding). However, there are certain activities for which the private sector in this country is too fragmented and lacks adequate resources to undertake the complete financial load.

The issue is what the appropriate balance between government and private initiative is, and where limited government funds are allocated. Ed.

NEW PRODUCT

Morval-Durofoam Ltd. (Kitchener, Ont.) announces it now has a below grade insulation:

Durofoam* R-Plus Below Grade Insulation

It is a rigid expanded polystyrene insulation, available in R8 (2' thick) and R10 2.5' thick) in 24'x96' and 48'x96' sheets.

The material is CMHC accepted, and meets Ontario Building Codes as a below grade insulation. Applications include insulation of foundations, footings, floor slabs, and drainage lines.

FEDERAL BUDGET

Construction Costs Go Up $ 200+

Details of the budget have been released. The government has imposed taxes on all energy conservation products and equipment that was previously exempt.

The Federal Sales Tax (FST) which is applied at the manufacturer's level will now apply to previously exempt items, which include:

insulation, heat pumps, solar collector panels, wind generators, windmills, heat recovery ventilators, and similar goods.

The sales tax is 6% (which is the same as applies on all construction materials). This tax comes into force on July 1, 1985. It will be increased to 7% January 1, 1986.

The expected impact of this tax hike is that the materials bill for a typical 1400 sq.ft. super insulated or R2000 house will go up by at least $180-200.00, accounted for by the sales tax on previously exempt insulation materials and heat recovery ventilators. This cost is compounded as the standard mark-up at each stage past the manufacturer is a percentage of cost, so the purchaser will in fact pay considerably more.

The FST hike is the most direct item that will have an impact on home builders. It will also apply on the manufacturer's selling price for all prefabricated construction goods and components.

Mobile homes and modular building units will also be taxed. In this case, the sales tax will apply on 70% of the selling price of the unit.

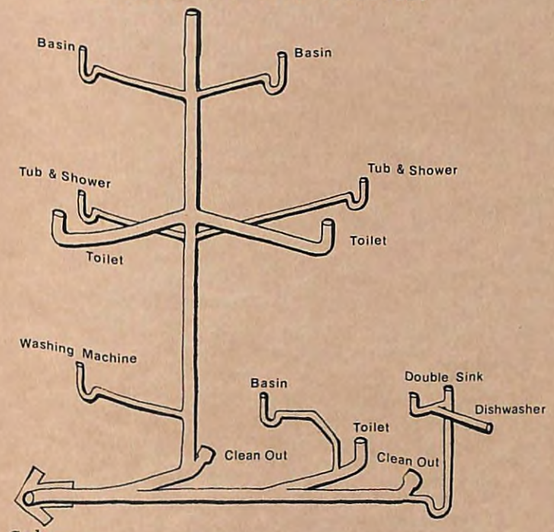
An indirect tax change that will affect all builders is the increased federal gasoline sales tax which adds 2 cents per litre effective September. The Minister of Energy states that the energy accord will reduce the basic price of gas, as the petroleum companies will no longer be paying this tax. We await this effect with interest. In B.C. the provincial government took over federal natural gas levies for itself, so gas prices are not going down here.

B C PLUMBING CODE CHANGES

Changes to the B.C. Plumbing code which come into effect in the fall of this year allow a house plumbing system to use a single vent for all plumbing in the house, regardless of how far the fixture is from the stack.

With a 38mm vent stack, offsets of 6 to 7 meters are no problem. Increasing the vent stack to 75mm permits unlimited offsets.

Al Koehli, the R2000 coordinator for B.C. has been instrumental in spearheading the changes that will be implemented in the B.C. Plumbing Code. He points out that while it may seem extraordinary, the single vent is really a commonsense solution, one that is used in many parts of the world. It seems that our plumbing codes in Canada are over cautious.



Schematic layout of the single vent plumbing layout in Al Koehli's house.

There are no technical problems in the functioning of a variety of plumbing fixtures off a single vent. There already are many single vent plumbing installations in the country - classed as illegal (many owner built). The rationale behind our present venting requirements are lost in the mists of time.

The single plumbing vent simplifies tightening a house as there is only one vent to worry about.

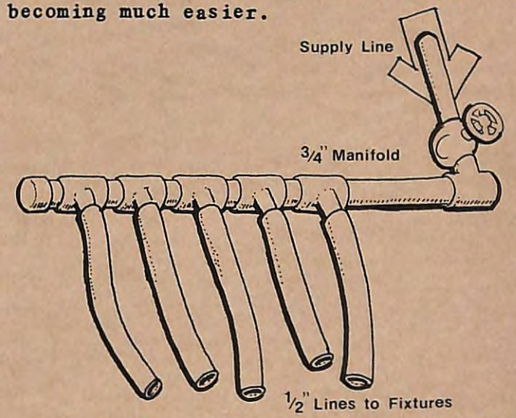
To our knowledge, the plumbing codes in the other provinces will still contain the old standards. Based on the coming experience in B.C. the idea should find its way into other jurisdictions in Canada in the near future.

This change will, of course, be of special help in renovation addition work, as separate vents for each plumbing cluster location will not be necessary. It will be easier to install an extra plumbing fixture without tearing-up large sections of the house to accomodate plumbing vents.

DOMESTIC WATER MANIFOLD

A simple way to provide even pressure in all plumbing lines.

The copper industry will not be too happy, nor will the plumber who is a secret pyromaniac living by blow torch and solder. With the advent of plastic piping, for both hot and cold plumbing, piping is becoming much easier.



Al Koehli used polybutylene piping throughout, for both hot and cold water, in his own, recently completed R2000 house. The flexibility of plastic piping allowed him to run the piping between and through joists just like electrical wiring - no need for 90 degree bends, no solder joints. Because of the ease of working with the plastic, and to provide an even, constant pressure through the system, he devised a system using a 3/4" plastic manifold, from which a 1/2" line was fed directly to each fixture. A shutoff valve is placed where the supply line comes into the manifold.

The house has two loops (the kitchen was kept separate), to allow for continuous water service into the house in the event that some fixture needs servicing, and the shutoff valve must be closed.

BUILDING CODE CHANGES

The regulation of building construction is the responsibility of the provinces. The National Building Code of Canada (NBC), developed by the National Research Council, is a model code, which in itself has no status unless it is adopted by the appropriate local authority. For the last 10 years or so, all provinces in Canada have used the NBC (with some minor modifications) as their code.

Every 5 years (or as often as is judged necessary), the NBC is revised. 1985 is the year for one of these reviews. The 1985 edition is now available.

Energy conservation measures are not included in the NBC. However, the NRC has a document titled 'Measures for Energy Conservation in New Buildings' It forms the basis of energy regulations in Quebec and some of the other provinces.

The status of the 1985 NBC and its implementation is as follows:

B.C.: a commitment to adopt the code has been made. Some 150 items (revisions or potential revisions) are still being considered. Changes will include, for the first time, an energy package including mandatory minimum insulation requirements. Implementation of the revised code will not take place until late this year - November or December.

ALBERTA: It is presently in the final legal stages of adoption. The code combines local building regulations. It is expected to be adopted in June (but the effective date is not yet certain).

SASKATCHEWAN: No provincial code in the past, planning to adopt the NBC as the provincial code effective April 1986. Presently establishing appropriate administrative mechanisms.

MANITOBA: Presently reviewing the new code, plans to adopt it by the end of the year.

ONTARIO: Updated the provincial code in November 1983. At the moment have no plans for adoption of 1985 NBC.

QUEBEC: 1980 NBC adopted as provincial code 1 year ago. 1985 NBC presently being reviewed, but no plans in place at the moment for its adoption.

OTHER PROVINCES/TERRITORIES: have no provincial codes. Building regulations are municipal responsibility. In most cases, the local authorities use the NBC as the basis of the local code. Status of 1985 NBC in these areas not certain at the moment.

We had expected to report in this issue on how various revisions will touch on issues of energy efficient building practice. However, final versions are not yet ready. Implementation of the revised code will not take place until late this year - in B.C. it is expected to be November or December.

PRODUCT SOURCE LIST

HARD TO FIND ENERGY CONSERVING PRODUCTS: A B.C. SOURCE LIST

Builders and homeowners often complain that many energy conserving products are hard to find. To help overcome this problem, the Canadian Homebuilders Association recently issued a National Catalogue of Residential Energy Conserving Products and Services. Only a limited number of this publication were printed.

As evidence of the need, all the copies were snapped up, and it is out of print. No decision has yet been made if or when it will be reprinted.

To help B.C. residents find local suppliers for these products, a publication has been prepared by the Port Coquitlam Energy Information Centre. This was one of the last projects of the centre before its funding ran out.

The B.C. Source List does not have detailed descriptive commentaries about the various products, as it was designed as an appendix to the National Catalogue. It makes for boring reading, with no plot, it is only a step above the Yellow Pages for interest.

However, like the Yellow Pages, it is an invaluable reference list for anyone looking for specific products. Entries are listed by product type and within 4 geographical regions of B.C. A handy feature is a chart of retailers, arranged by region, which tells you at a glance the products each carries. Copies (free) are available from:

Energy Mines β Resources Canada
200-100 West Pender St.
Vancouver, B.C. V6B 1R8
Tel: (604) 666-5949
Tel: 112-800-663-1280

NATURE'S AIR FILTER

BIOLOGICAL AIR PURIFICATION

Spider plants have been identified as an excellent purifier of indoor air.

Well sealed, air tight energy efficient houses generate indoor air pollution - a problem that is recognized and for which mechanical ventilation system and heat recovery ventilators have been developed.

In an effort to develop a practical means of preventing accumulation of toxic substances in the atmosphere of future space stations and energy efficient buildings on earth, the National Aeronautics and Space Adminstration (NASA) in the USA has been evaluating the use of biological processes.

Research at NASA's laboratories has demonstrated the ability of house plants to remove indoor air pollutants such as formaldehyde, carbon monoxide and nitrogen dioxide - thus purifying the air. (In test chambers, formaldehyde concentrations decreased from 14 parts per million to 2 ppm in 6 hours).

Indoor pollutants are generated during combustion of fossil fuels, by tobacco smoke, or the offgassing from building materials and furnishings.

Based on the rate of the absorption processes, 8 - 15 spider plants (in 1 gal pots) will meet the air purification needs for an average 167 m^2 house (1800 sq.ft.).

Research is continuing with the hope of identifying other plants that can absorb or effect the removal of formaldehyde and other gases as efficiently as spider plants.

UPDATE

HRV CERTIFIED INSTALLER PROGRAM

The first series of training courses for heat recovery ventilator installers has just been completed by the Heating Refrigeration Air Conditioning Institute (HRAI). Despite a late start and some confusion, 50 courses were held in all parts of the country, with some 1000 persons taking part.

The only region where scheduled courses had to be cancelled due to poor response was in Saskatchewan. Only 1 session took place there. The reason for this poor response in Saskatchewan has not yet been determined, but it could be a lack of interest or not enough advance notice. Since this is the province that was the pioneering centre of low energy building activity and development, it would seem that the later is more probable.

Another series is being planed for the fall. Details are still to be worked out, but will take into account the feedback gained in the first round.

HRV Design Course:

A 1 day design course to go along with the installer's course is being considered. Whether it goes ahead will depend on input from EMR and the R2000 program.

HRV TESTING

Last winter the first comparative test results of heat recovery ventilator performance were published. The tests, conducted at the Ontario Research Foundation, received mixed reaction. Due to the problems uncovered with the test methods, they were to be redone, to provide more accurate perfomance data. The tests have been performed, and are in the hands of EMR. At press time, EMR was not ready to publish the revised HRV performance results. They expect to do so in 'a couple of months'.

Do you have an innovative building idea? an interesting energy efficient design? technical questions you want answered?

Do you need more information about any item in this issue? Would you like to follow up any issues discussed? Let us know.

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HRV PRODUCT MARKETING β TECHNICAL UPDATE SEMINAR

Eneready Products is organizing an update seminar for mechanical trades for Thursday, July 4, 1985, 6:30-9:30 pm. For details, contact Eneready Products Ltd. 604-433-5697

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Fine Homebuilding magazine is known for its high quality, clearly described articles on various building topics.

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The material is reprinted just as it appeared in the magazine, accompanied by photos and illustrations.

$34.95. Available from The Drawing-Room Graphic Services Ltd.

NEXT ISSUE:

Stories we are working on for coming issues include:

* Heating systems for energy efficient houses. How to decide which system to use, what products are available on the market.

* Retrofitting the older house. Cost effective methods.

* Computer programs specially prepared for the builder and designer.

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